MCS 352
DUAL SYSTEM

FOR

Gasoline (Petrol) and
Diesel Engines

OPERATORS MANUAL

MOTORVAC TECHNOLOGIES INC.

MCS352
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Introduction

Congratulations on your selection of the **CARBONCLEAN DUAL SYSTEM.** By choosing this product, you are acquiring the most technologically advanced method available for cleaning harmful fuel system contaminants from gasoline engines.

The **MCS 352** is a self-contained cleaning system, designed to connect to any gasoline or diesel engine (up to 7.3L). Once the unit is connected, it temporarily replaces the regular fuel supply with a mixture of fuel and the specially formulated **CarbonClean Cleaning Detergent.**

With the engine idling, the unit pumps the fuel/detergent mixture through the engine's fuel system. As the mixture passes through the vehicles' fuel system, it loosens and dissolves accumulated deposits, which then pass harmlessly out through the exhaust system or are removed by the unit's fuel filter. Removing contaminants from the combustion chamber creates a more even burn of fuel, which improves horsepower, increases fuel economy, and reduces exhaust emissions.

Please refer to the chart below for the recommended service intervals:

Recommended Service Intervals

Type of Vehicle	Mileage
Automobile - Gasoline	12,000 – 15,000 miles or 19,000 – 24,000 kilometers or once a year
Automobile - Diesel Light-Duty Trucks	12,000 – 15,000 miles or 19,000 – 24,000 kilometers or once a year
Medium to Heavy-Duty Trucks	60,000 – 100,000 miles or 97,000 – 161,000 kilometers or 1600 to 1800 hours of operation

Please study this *User Guide* to become thoroughly familiar with the **MCS 352** before using it.

IMPORTANT

The MCS 352 Fuel System Machines are designed to work *EXCLUSIVELY* With CarbonClean Cleaning Detergents.

Use of any other chemicals during this process may cause operational failure of the MCS 352 and voids the manufacturer's warranty. See warranty card for details.

Overview

This manual contains all the information you need to use the **MCS 352**. Please make sure all technicians have read this manual and have it within easy reach whenever the unit is being used.

The following is a quick reference to the information in this manual:

System Features and Functions

This chapter describes the **MCS 352** gauges, control switches, and connections.

Safety Information

Adhere to the safety guidelines in this chapter at all times!

Before You Begin

Follow the instructions for each chapter before using the unit for the first time.

Fuel System Cleaning Procedures

These chapters contain step-by-step setup and cleaning procedures for using the unit with each of the fuel system types: Carburetor, Throttle Body Injection (TBI), Port Fuel Injection (PFI), Continuous Injection System (CIS) and Diesels.

Troubleshooting and Additional Help

Turn to this chapter in the unlikely event you have problems with your MCS 352.

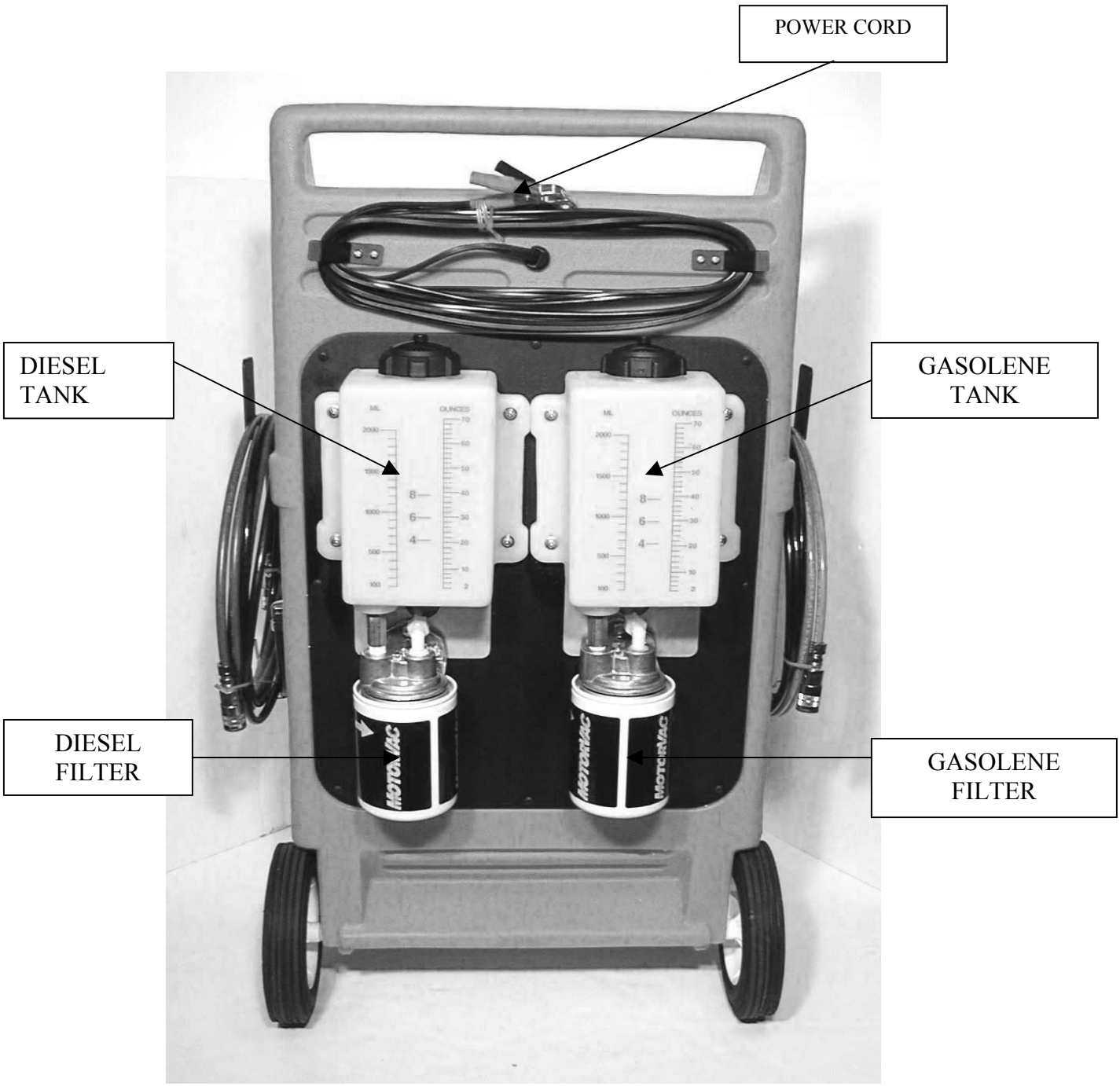
Appendices – Maintenance, Accessories, Parts, and MSDS reports.

The appendices contain routine maintenance procedures for the **MCS 352**, such as changing the fuel filters, and the Material Safety Data Sheets.

System Features and Functions

The front of the **MCS 352** cabinet contains the control panel, control switches and status indicators. The fuel reservoirs and filters are mounted on the sides of the cabinet.

MCS 352 - BACK VIEW



MCS 352 Control Panel Functions

GASOLENE PRESSURE GAUGE

ON/OFF SWITCH

START/RUN SWITCH

DIESEL PRESSURE GAUGE

TIMER

SERVICE SELECTOR SWITCH

GASOLINE (PETROL) PRESSURE REGULATOR

CIRCUIT BREAKER

MCS 352 Features and Functions

Descriptions of the gauges, control switches, and status indicators making up the control panel are listed below. Please become familiar with these features and functions before using the unit**.**

Adjust Time Knob	Sets or re-sets the system run time in one-minute increments, from 1 to 60 minutes.
Service Selector Switch	Selects fuel type: Diesel or Gasoline
Start/Run Switch (Momentary)	Starts the cleaning cycle.
Run Cycle Light (green)	Illuminates when the run cycle is under way.
On / Off Switch	Shuts off power to the unit.
On / Off Light (orange)	Illuminates when switch is on.
Fuel Pressure Gauge	Displays output pressure of the unit's output hose.
Pressure Adjust Regulator	Used to adjust the gasoline (petrol) system pressure during the cleaning process on single line fuel systems. Turn clockwise to close (increase the pressure), counterclockwise to open (decrease the pressure). Normally closed clockwise for services on two line systems. (Vehicle controls pressure on two line systems.)
Warning Alarm	Sounds until pump builds pressure, or when the run cycle is complete or when a pressure loss occurs.
Output Hose (red)	Connects to the input side of the vehicle's engine fuel system.
Return Hose (black)	Connects to the return side of the vehicle's engine fuel system.
Fuel Filter	Filters out contaminants that become removed during the cleaning process. See **Appendix** for replacement information
Battery Cables	Positive (red) and negative (black) battery connections (12 VOLTS DC)
Circuit Breaker	15 Ampere circuit breaker for pump
Fuel Tanks (2)	Holds up to 2 liters (70oz.) per tank

Safety Information and Precautions

/!\ DANGER

Vehicle exhaust gases contain Carbon Monoxide, which is a colorless and odorless lethal gas.
Only run engines in well-ventilated areas and avoid breathing exhaust gases.
Extended breathing of exhaust gases will cause serious injury or death.

/!\ WARNING

Exhaust gases, moving parts, hot surfaces, and potent chemicals are present during the use of the fuel system cleaner.
Read and understand the operator's manual before using the fuel system cleaner.
When using chemicals always refer to the MSDS sheets and manufacturer's instructions for the proper procedure to handle emergency medical treatment, cleanup, handling and storage requirements.
Improper use of the fuel system cleaner or exposure to exhaust gases or cleaning chemicals can cause injury.

Flammable fuel chemical and vapors can ignite.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Always keep fully charge fire extinguisher nearby. The extinguisher should have a class B rating and be suitable for gasoline, chemical, and electrical fires.
Cleanup any fuel or chemical spills immediately.
Dispose of contaminated cleanup material according to governing environmental laws.
Never look directly into the air induction plenum or carburetor throat when the engine is operating.
Always plug or cap any open fuel lines during service.
Keep Cleaner and Detergent container closed except when filling reservoir.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

Flammable liquid can splash out of reservoir when pump is on and/or unit is being moved.
Always keep Reservoir Cap secure except when filling reservoir.
Explosion or flame can cause injury.

Many fuel systems maintain residual pressure in fuel lines even after the engine has been turned off.
Wear safety goggles.
Wear chemical resistant gloves when connecting or disconnecting fitting and adaptors.
Obtain ZERO psi before connecting or disconnecting any fuel lines or adaptors.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

See next page

Chemicals can cause harmful byproducts.
Use only approved chemicals (refer to operator's manual).
Do not swallow or ingest any chemicals.
Use with adequate ventilation. Avoid breathing vapors.
Do not store chemicals on or in the machine.
Improper use of chemicals can cause injury.
Over exposure can have harmful effect on eyes, skin, respiratory system and possible unconsciousness and asphyxiation.

Improperly blocked vehicles can move.
Set the parking brake and chock the wheels.
Moving vehicles can cause injury.

Moving engine parts.
The engine-cooling fan will cycle on and off depending on the coolant temperature and could operate without the engine running.
Wear safety goggles.
Always keep objects, clothing, and hands away from the cooling fans and engine parts.
Moving engine parts can cause injury.

Hot surfaces are present during and after running the engine.
Do not contact hot surfaces such as, manifolds, pipes, mufflers, catalytic converters or radiators and hoses.
Hot surfaces can cause injury.

Catalytic converters become extremely hot.
Do not park a converter-equipped vehicle over dry grass, leaves, paper, or any other flammable material.
Do not touch a catalytic converter until the engine has been off for at least 45 minutes.
For tests allowing unburned hydrocarbons or service involving operation of an overly rich condition, minimize the time of rich operation, monitor the catalytic converter temperature, and allow at least two minutes of operation at normal mixture subsequent to testing or service for converter cooling.
Catalytic converters can cause burns.

Cracked fan blades can become airborne.
Examine fan blades for cracks. If found, do not service the vehicle.
Flying objects can cause injury.

See next page

Batteries produce explosive gases and can explode.

Wear safety goggles when working on or near batteries.

Use in a well-ventilated area.

Keep sparks and flames away from the battery and never lay tools, equipment or other conductive objects on the battery.

When tools or equipment is connected to the battery, make sure the equipment power switch is off. Connect the positive lead of the equipment to the positive lead of the battery first; connect the negative lead of the equipment to a solid ground point as far from the battery as possible.

Keep battery acid away from skin or eyes. In case of eye contact, flush with clean water for 15 minutes and get medical attention.

Battery explosion and ignited gases can cause injury.

Before You Begin
Gasoline (Petrol) Systems

First Time Operation

> **NOTE**
>
> **The following process is used to flush factory-testing fluids out of your new machine, and is only necessary before the first time you use the unit.**

1. Verify that the fuel filter is connected and securely in place on the side of the cabinet**.**

2. Check the output/return hoses, battery connections, and all external components for damage**.**

3. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** on the unit's control panel counterclockwise until it is completely open**.**

4. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Press the **SERVICE SELECTOR** switch to the side with Gasoline (Petrol) FUEL SYSTEM SERVICE.

5. Fill the reservoir on the back/right side with **clean gasoline (petrol)** until the **tank level** indicates 1/4 tank**.** See notes on page 3-2 and figure 3-3 for alternate filling procedure.

6. Connect the output (**red**) hose and return (**black**) hose together by using the 060-1100 and 060-1400 adaptors. Securing them together with a clamp. Follow the procedures below to flush fuel through the system:

- Set **SERVICE SELECTOR** to gasoline (petrol) **SERVICE SYSTEM**.
- Set the **TIMER** knob for five minutes.
- Press the **ON/OFF** switch to the **on** position. **NOTE: Alarm will sound continually until pump starts.**
- Press and hold the **START/RUN** switch for five minutes.
- Release the **START/RUN** switch.
- Turn **off** the **ON/OFF** switch.

7. Disconnect the output and return lines.

8. Connect the #060-1400 adaptor to the output hose, then drain the gasoline from the reservoir using the following procedure:

- Set the **TIMER** knob for five minutes.
- Direct the output (**red**) hose into an appropriate container.

- Press the **ON/OFF** switch to the **on** position. **NOTE: Alarm will sound continually until pump starts.**
  - Press and hold the **START/RUN** switch until the fuel from the unit has been emptied into the container.
  - Release the **START/RUN** switch.
  - Turn **off** the **ON/OFF** switch.
  - **Dispose of the fuel in an environmentally approved method.**

9. The reservoir is now completely drained of fuel. Follow the steps below before performing the first cleaning service:

Mixing Ratios

Using a separate container or the MCS 352 reservoir, follow the chart below to mix the proper amounts of CarbonClean Cleaning Detergent for Gasoline and fuel for the cleaning process.

NOTE: See page 3-3, when utilizing tee adapter 060-4500 for alternate filling procedure. Always have the ball valve on tee adapter closed until ready to fill reservoir while using the vehicles fuel pump. After connecting all hoses, start engine. Check all connections for leaks. Partially open ball valve just enough to allow gasoline (petrol) to flow into reservoir and not have the engine die.

NOTE:

The proper ratio is 1 oz. (30 ml.) per cylinder to 3 oz. (90 ml.) gasoline.

DETERGENT / GASOLINE (PETROL) RATIO

3 cylinders = 3 oz. (90 ml.) detergent to 9 oz. (270 ml.) gasoline, (360 TOTAL)

4 cylinders = 4 oz. (120 ml.) detergent to 12 oz. (360 ml.) gasoline, (480 TOTAL)

5 cylinders = 5 oz. (150 ml.) detergent to 15 oz. (450 ml.) gasoline, (600 TOTAL)

6 cylinders = 6 oz. (180 ml.) detergent to 18 oz. (540 ml.) gasoline, (720 TOTAL)

8 cylinders = 8 oz. (240 ml.) detergent to 24 oz. (720 ml.) gasoline, (960 TOTAL)

10 cylinders = 10 oz. (300 ml.) detergent to 30 oz. (900 ml.) gasoline, (1200 TOTAL)

12 cylinders = 12 oz. (360 ml.) detergent to 36 oz. (1080 ml.) gasoline, (1440 TOTAL)

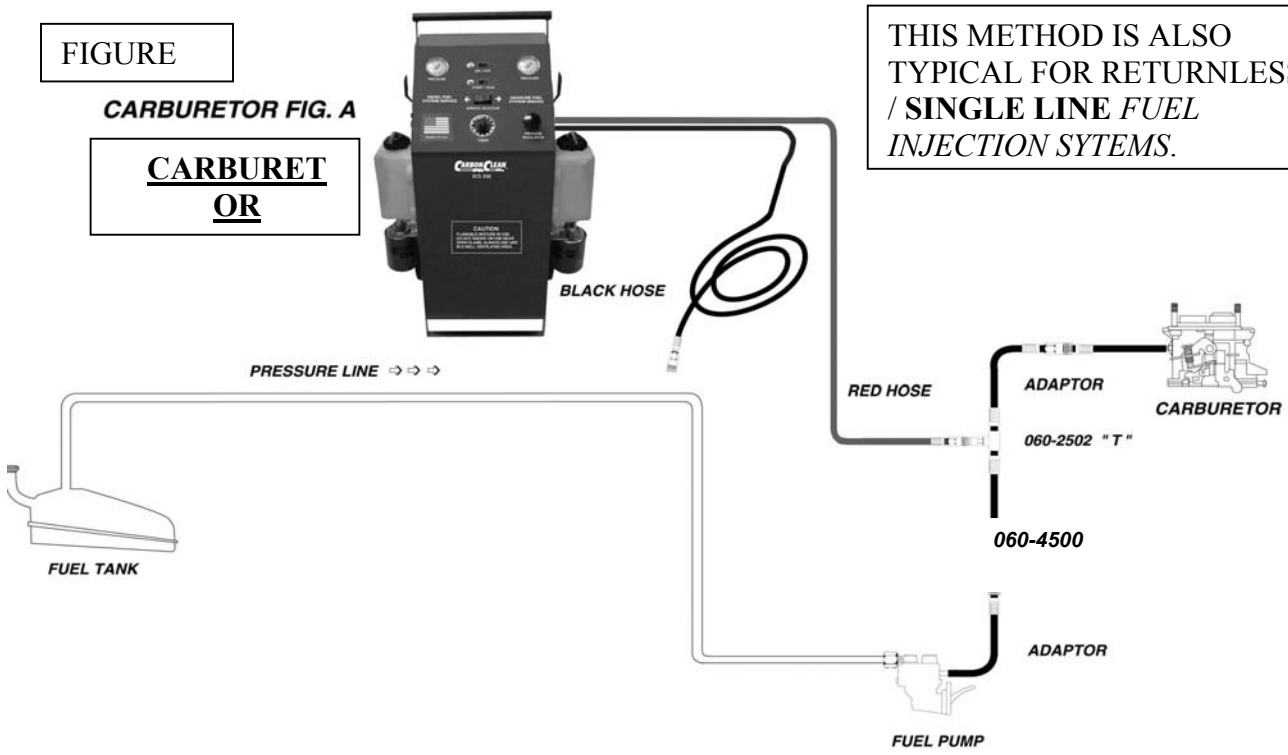
Filling Reservoir Procedure-NOTE: regulator valve must be open to allow flow for tank filling. Alternate-use black hose.

FIGURE

CARBURETOR FIG. A

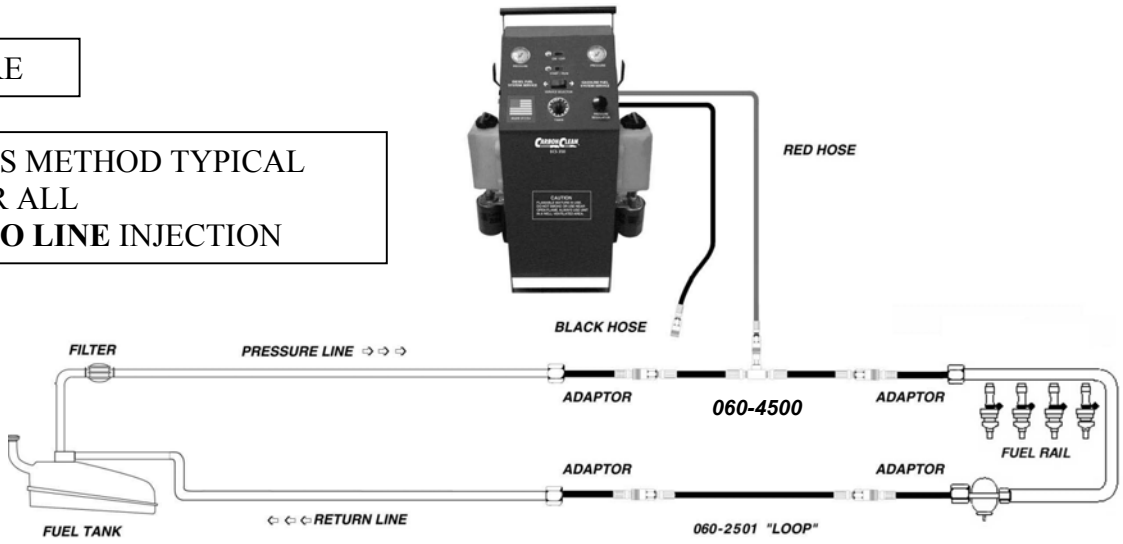
CARBURETOR

THIS METHOD IS ALSO TYPICAL FOR RETURNLESS / **SINGLE LINE** *FUEL INJECTION SYTEMS.*



FIGURE

THIS METHOD TYPICAL FOR ALL **TWO LINE** INJECTION



Fuel System Cleaning Procedures
Gasoline (Petrol) Systems

Determining the Vehicle's Fuel System Type

It is very important to determine the fuel system type of the vehicle to be serviced before performing
Any setup or cleaning procedure on the vehicle. The unit can be used with any of the four different types of gasoline fuel systems listed below:

Carburetion

Carburetors come in a variety of sizes and shapes. These can be easily identified by locating the choke plate in the air horn.

Throttle Body Injection (TBI)

Throttle bodies are centrally mounted, as are carburetors, and use one or two electronic injectors.

Port Fuel Injection (PFI)

This system uses a single electronic injector per cylinder, mounted so that fuel spray is directed into the intake port.

Continuous Injection System (CIS)

A Continuous Injection System is easily identified by noting the fuel distributor and the solid steel or flex steel lines running from the fuel distributor to each individual injector. The fuel distributor controls the amount of fuel sprayed into the intake port while the injectors control the opening and closing pressure.

NOTE

Once you have determined the fuel system type, turn to the appropriate section in this chapter for instructions on how to perform the fuel line setup and cleaning procedure for that system.

Carburetor *Setup* Procedure

Follow the steps below to connect the unit to the vehicle's fuel system. Make sure the vehicle has at least 1/8 tank of fuel before beginning this process.

1. Start the vehicle and allow the engine to reach normal operating temperature**.**

IMPORTANT

Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low.
If necessary, add oil and/or coolant to the vehicle.

2. **Turn the vehicle OFF** when normal operating temperature has been reached.

3. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** counterclockwise until the regulator is completely open. Verify that the **ON/OFF** switch is turned **off.**

4. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Press the **SERVICE SELECTOR** switch to the side with Gasoline (Petrol) FUEL SYSTEM SERVICE.

5. Remove the vehicle's gas cap to relieve fuel tank pressure.

6. Disconnect the vehicle's fuel line at the carburetor inlet or at the fuel pump outlet. There should now be two open ends to work with:

- one coming from the fuel pump.
- One going into the carburetor.

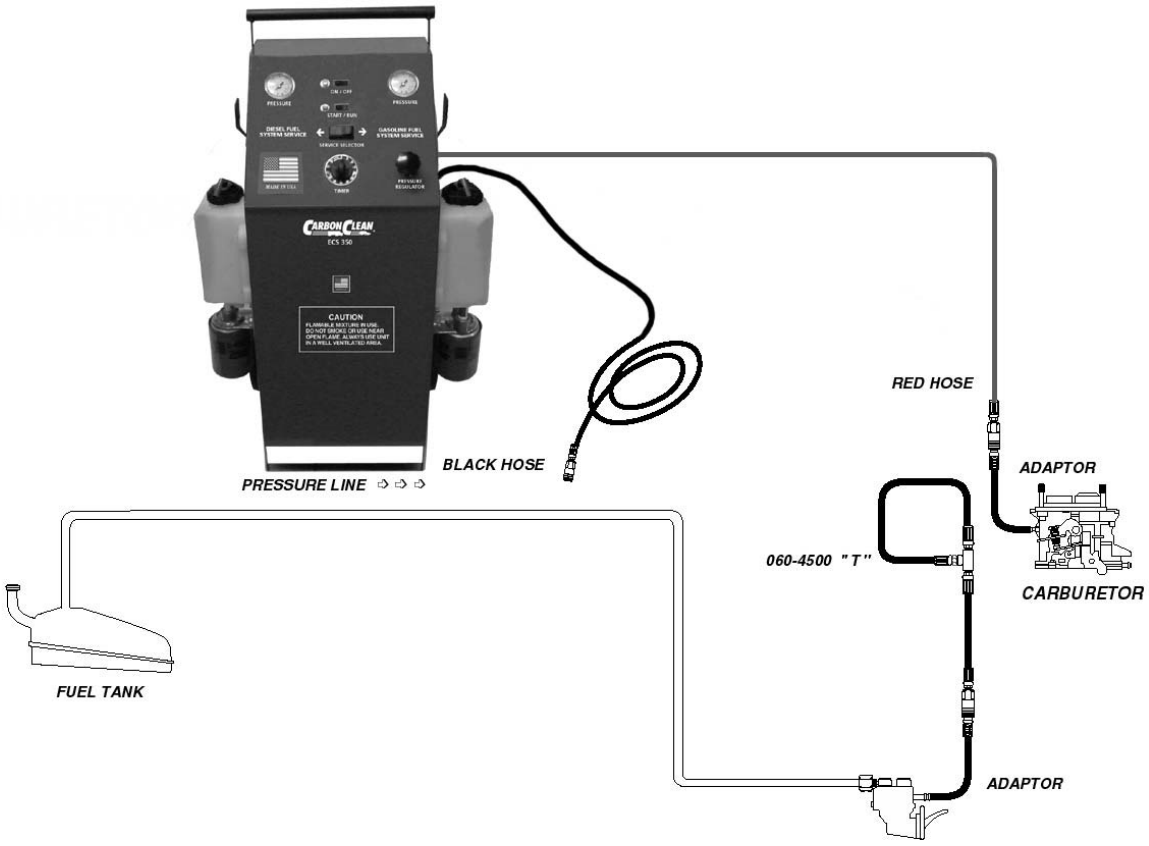
7. Add a pre-mixed gasoline and detergent mixture to the right side (gasoline /petrol) reservoir. When filling the reservoir, add **1 oz. (30 ml.) of Detergent to 3 oz. (90 ml.) gasoline per cylinder.** See page 3-3 for alternate filling method (Refer to page 3-2 for the proper ratios.)

SEE NEXT PAGE

/!\ WARNING

Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Wear Safety goggles.
Obtain ZERO pressure before connecting or disconnecting any fuel lines or adaptors.
Wear chemical resistant gloves when connecting or disconnecting fittings and adaptors.
Wrap shop towel around pressure fittings and adaptors when disconnecting.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

8. As shown in the figure below, connect the **MCS 352** output **(red)** hose to the inlet of the carburetor and block / deadhead the fuel line coming from the vehicle's fuel pump.



You are now ready to perform the carburetor cleaning procedure.

Carburetor *Cleaning* Procedure

Follow the steps below to circulate the fuel/detergent mixture through the vehicle's carburetor.

1. Verify that **Carburetor Setup Steps 1- 8** above have been completed.

2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.

3. Adjust **TIMER** knob for 30 minutes. (Run time may be adjusted depending on the condition of the vehicle's fuel system.)

4. Press the **ON/OFF** switch **on**.

5. Press and hold the **START/RUN** switch.

6. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** clockwise until the Fuel **PRESSURE** gauge reads **4 PSI,** or the equivalent of the manufacturer's recommended specifications.

7. Release the **START/RUN** switch. **Check all connections for leaks.**

8. **Start the vehicle** to begin the fuel system cleaning process.

- when the cleaning process is halfway completed, step on the vehicle's accelerator quickly three or four times. **Then, maintain 1500 – 2000 RPM for 30 seconds.**

9. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Press **off** the **ON/OFF** switch.

10. **Turn OFF the vehicle's engine.**

11. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** counterclockwise on the unit to release any residual pressure.

IMPORTANT

Wrap a shop towel around pressure fittings before disconnection to protect against residual fuel spray.

12. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.

SEE NEXT PAGE

13. Re-install the vehicle's gas cap.

14. **Start the vehicle** and verify that there are no leaks.

15. Test drive the vehicle for five kilometers (3 miles) immediately following the cleaning service to flush all detergent from the vehicle's fuel and exhaust systems.

Throttle Body Injection (TBI) *Setup* Procedure

Follow the steps below to connect the unit to the vehicle's fuel system. Make sure the vehicle has at least 1/8 tank of fuel before beginning this process.

1. Start the vehicle and allow the engine to reach normal operating temperature**.**

> **IMPORTANT**
> **Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low.**
> **If necessary, add oil and/or coolant to the vehicle.**

2. **Turn the vehicle OFF** when normal operating temperature has been reached.

3. Turn the Gasoline (Petrol) PRESSURE **REGULATOR** counterclockwise until the regulator is completely open. Verify that the **ON/OFF** switch is turned off**.**

4. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Press the **SERVICE SELECTOR** switch to the side with Gasoline (Petrol) FUEL SYSTEM SERVICE.

5. Remove the vehicle's gas cap to relieve fuel tank pressure.

6. Disconnect the vehicle's fuel lines from the throttle body. There are now four open ends to work with:

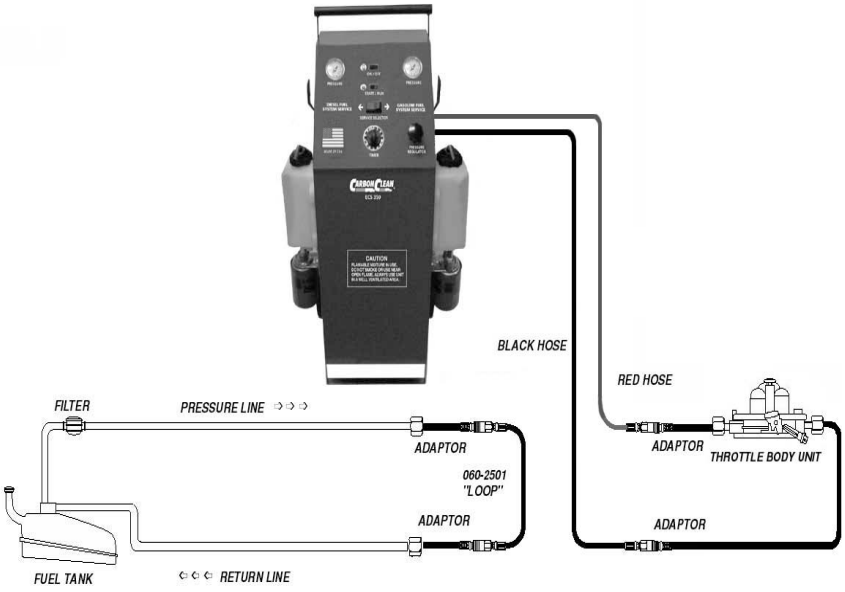
Pressure Line	**Return Line**
From the tank to the throttle body.	From the throttle body to the tank.

7. Add a pre-mixed gasoline and detergent mixture to the right side (gasoline /petrol) reservoir. When filling the reservoir, add **1 oz. (30 ml.) of Detergent to 3 oz. (90 ml.) gasoline per cylinder.** See page 3-3 for alternate filling method (Refer to page 3-2 for the proper ratios.)

/!\ WARNING

Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Wear Safety goggles.
Obtain ZERO pressure before connecting or disconnecting any fuel lines or adaptors.
Wear chemical resistant gloves when connecting or disconnecting fittings and adaptors.
Wrap shop towel around pressure fittings and adaptors when disconnecting.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

8. As shown in the figure below, connect one end of the loop adaptor (#060-2501) to the pressure line coming from the vehicle's fuel tank. Connect the other end of the loop adaptor (#060-2501) to the return line going back to the fuel tank. This forms a tank-to-tank loop, making it unnecessary to disconnect the fuel pump.



9. As shown in the figure above, connect the output (**red**) hose from the unit to the adaptor on the pressure line going into the TBI unit.

10. As shown in the figure above, connect the return (**black**) hose from the unit to the adaptor on the return line coming from the TBI unit.

- **You are now ready to perform the TBI cleaning procedure.**

Throttle Body Injection (TBI) *Cleaning* Procedure

WARNING: BEFORE BEGINNING THE RAIL FLUSH PROCEDURE IT IS IMPORTANT TO TEST THE VEHICLE FOR INJECTOR LEAKDOWN. IF AN INJECTOR IS STUCK OPEN IT IS POSSIBLE TO DAMAGE THE ENGINE DUE TO 'HYDROLOCK". (LIQUID FILLING THE CYLINDER). IF THE VEHICLE HAS INJECTOR LEAKAGE DO NOT DO THE RAIL FLUSH, PROCEDE DIRECTLY TO THE ENGINE RUNNING-CLEANING PROCESS.

RAIL-FLUSH PROCEDURE. Follow these steps to circulate the cleaning mixture through the **TBI** unit to clean the throttle body, injector screens, and pressure regulator.

1. Verify that **TBI Setup Steps 1-10** above have been completed before continuing.

2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.

3. Adjust **TIMER** knob for 10 minutes. Press the **ON/OFF** switch **on**.

4. Press and hold the **START/RUN** switch until pressure builds.

5. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** clockwise until closed. While in the recirculating (rail-flush) mode, the TBI unit is being cleaned, and the particles are filtered through the unit's filter.

6. **Check all connections for leaks.**

   - Make a note of the fuel pressure reading; this is the true opening pressure of the vehicle's pressure regulator without vacuum assist when the engine is at normal operating temperature.

   - **NOTE:** By turning the Gasoline (Petrol) **PRESSURE REGULATOR** in and out and **"PULSING"** the mixture from time to time, the cleaning process will be enhanced in this mode.

7. After the 10 minutes has expired adjust **Timer** knob for an additional 30 minutes. (Run time may be adjusted depending on the condition of the vehicle's fuel system.)

8. Press the **START/RUN** switch.

9. **Start the vehicle** to begin the fuel system cleaning process.

10. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Press **off** the **ON/OFF** switch.

11. **Turn OFF the vehicle's ignition.**

12. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** counterclockwise on the unit to open it and release residual pressure.

13. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.

14. Re-install the vehicle's gas cap.

15. **Start the vehicle** and verify that there are no leaks.

16. Test drive the vehicle for five kilometers (3 miles) immediately following the cleaning service to flush all detergent from the vehicle's fuel and exhaust systems.

IMPORTANT

Wrap a shop towel around pressure fittings before disconnection to protect against residual fuel spray.

Port Fuel Injection (PFI) *Setup* Procedure

WARNING: BEFORE BEGINNING THE RAIL FLUSH PROCEDURE IT IS IMPORTANT TO TEST THE VEHICLE FOR INJECTOR LEAKDOWN. IF AN INJECTOR IS STUCK OPEN IT IS POSSIBLE TO DAMAGE THE ENGINE DUE TO 'HYDROLOCK". (LIQUID FILLING THE CYLINDER). IF THE VEHICLE HAS INJECTOR LEAKAGE DO NOT DO THE RAIL FLUSH, PROCEDE DIRECTLY TO THE ENGINE RUNNING-CLEANING PROCESS.

Follow the steps below to connect the unit to the vehicle's fuel system. Make sure the vehicle has at least 1/8 tank of fuel before beginning this process.

1. Start the vehicle and allow the engine to reach normal operating temperature**.**

IMPORTANT

Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low.
If necessary, add oil and/or coolant to the vehicle.

2. **Turn the vehicle OFF** when normal operating temperature has been reached.

3. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** counterclockwise until the regulator is completely open. Verify that the **ON/OFF** switch is turned **off.**

4. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Press the **SERVICE SELECTOR** switch to the side with Gasoline (Petrol) FUEL SYSTEM SERVICE.

5. Remove the vehicle's gas cap to relieve fuel tank pressure.

6. Disconnect the fuel lines from the fuel rail. There are now four open ends to work with:

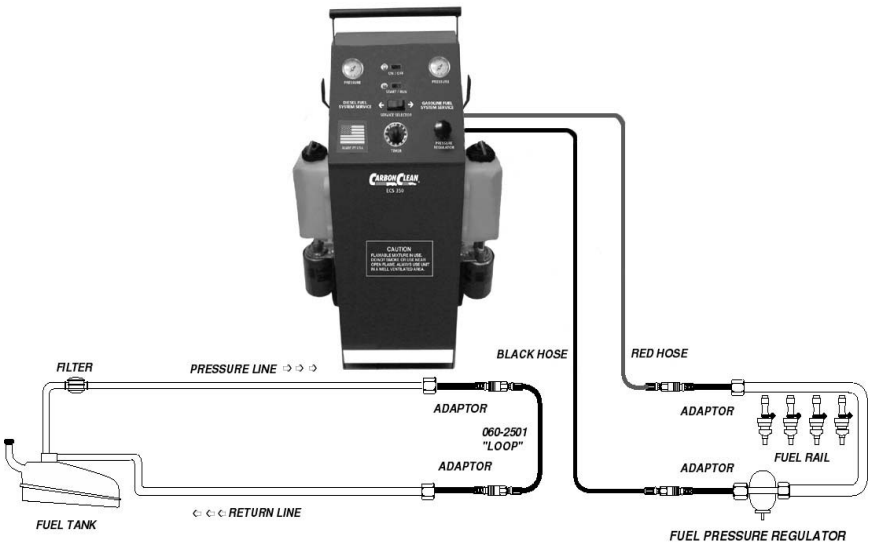
Pressure Line	**Return Line**
From the fuel tank to the fuel rail.	From the fuel rail to the fuel tank.

7 Add a pre-mixed gasoline and detergent mixture to the right side (gasoline /petrol) reservoir. When filling the reservoir, add **1 oz. (30 ml.) of Detergent to 3 oz. (90 ml.) gasoline per cylinder.** See page 3-3 for alternate filling method (Refer to page 3-2 for the proper ratios.)

/!\ WARNING

Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Wear Safety goggles.
Obtain ZERO pressure before connecting or disconnecting any fuel lines or adaptors.
Wear chemical resistant gloves when connecting or disconnecting fittings and adaptors.
Wrap shop towel around pressure fittings and adaptors when disconnecting.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

8. As shown in the figure below, connect one end of the loop adaptor (#060-2501) to the pressure line coming from the vehicle's fuel tank. Connect the other end of the loop adaptor (#060-2501) to the return line going back to the fuel tank. This forms a tank-to-tank loop, making it unnecessary to disconnect the fuel pump.



9. As shown in the figure above, connect the output (**red**) hose from the unit to the adaptor on the pressure line going into the fuel rail.

10. As shown in the figure above, connect the return (**black**) hose from the unit to the adaptor on the return line coming from the fuel rail.

You are now ready to perform the PFI cleaning procedure.

Port Fuel Injection (PFI) ***Cleaning*** Procedure

Follow these steps to circulate the cleaning mixture through the Port Fuel Injection unit to clean the fuel rail, injector screens, and pressure regulator.

1. Verify that **PFI Setup Steps 1-10** above have been completed before continuing.

2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.

3. Adjust **TIMER** knob for 10 minutes. Press the **ON/OFF** switch **on.**

4. Press and hold the **START/RUN** switch.

5. Turn the Gasoline (Petrol) PRESSURE **REGULATOR** clockwise until the **PRESSURE GAUGE** reads past **4 PSI.** The pump will remain on.

6. Release the **START/RUN** switch and continue to turn the Gasoline (Petrol) PRESSURE **REGULATOR** clockwise until it is completely closed. This will clean the PFI unit, injector screens, fuel rail, and pressure regulator while filtering contaminants through the unit's filter. **Check all connections for leaks.**

- Make a note of the fuel pressure reading; this is the true opening pressure of the vehicle's pressure regulator without vacuum assist when the engine is at normal operating temperature.

- NOTE: By turning the Gasoline (Petrol) PRESSURE **REGULATOR** in and out and "**PULSING**" the mixture from time to time, the cleaning process will be enhanced.

After the 10 minutes has expired, adjust **TIMER** to 30 minutes. (Run time may be adjusted depending on the condition of the vehicle's fuel system.)

7. Press the **START/RUN** switch.

8. **Start the vehicle** to begin the fuel system cleaning process.

9. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Press **off** the **ON/OFF** switch.

10. **Turn OFF the vehicle's ignition.**

12. Turn the Gasoline (Petrol) PRESSURE **REGULATOR** counterclockwise on the unit to release any residual pressure.

IMPORTANT

Wrap a shop towel around pressure fittings before disconnection to protect against residual fuel spray.

13. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.

14. Re-install the vehicle's gas cap.

15. **Start the vehicle** and verify that there are no leaks.

16. Test drive the vehicle for five kilometers (3 miles) immediately following the cleaning service to flush all detergent from the vehicle's fuel and exhaust systems.

Continuous Injection System (CIS) *Setup* Procedure

WARNING: BEFORE BEGINNING THE RAIL FLUSH PROCEDURE IT IS IMPORTANT TO TEST THE VEHICLE FOR INJECTOR LEAKDOWN. IF AN INJECTOR IS STUCK OPEN IT IS POSSIBLE TO DAMAGE THE ENGINE DUE TO 'HYDROLOCK". (LIQUID FILLING THE CYLINDER). IF THE VEHICLE HAS INJECTOR LEAKAGE DO NOT DO THE RAIL FLUSH, PROCEDE DIRECTLY TO THE ENGINE RUNNING-CLEANING PROCESS.

Follow the steps below to connect the unit to the vehicle's fuel system. Make sure the vehicle has at least 1/8 tank of fuel before beginning this process.

1. Start the vehicle and allow the engine to reach normal operating temperature**.**

IMPORTANT

Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low. If necessary, add oil and/or coolant to the vehicle.

2. **Turn the vehicle OFF** when normal operating temperature has been reached.

3. Turn the Gasoline (Petrol) PRESSURE **REGULATOR** counterclockwise until the regulator is completely open. Verify that the **ON/OFF** switch is turned **off.**

4. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Press the **SERVICE SELECTOR** switch to the side with Gasoline (Petrol) FUEL SYSTEM SERVICE.

5. Remove the vehicle's gas cap to relieve fuel tank pressure.

6. Disconnect the vehicle's fuel lines from the fuel distributor. There are now four open ends to work with:

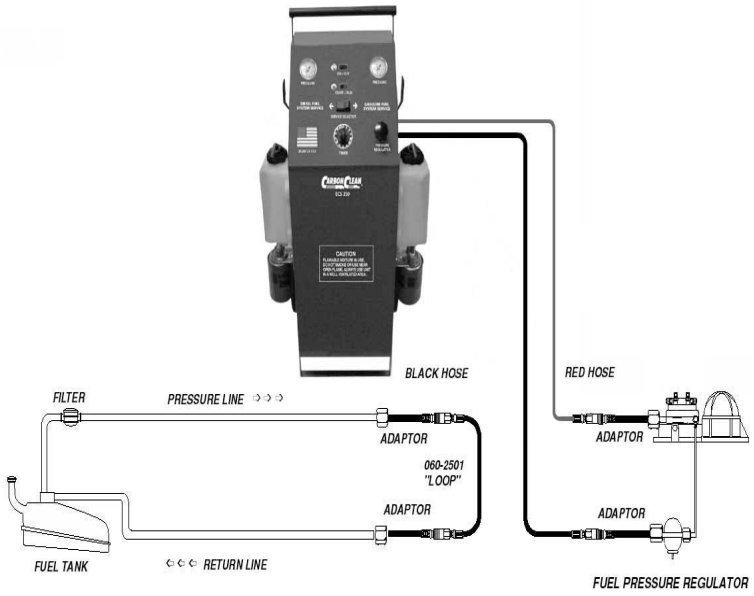
Pressure Line	**Return Line**
From the fuel tank to the fuel distributor.	From the fuel distributor to the fuel tank.

7. Add a pre-mixed gasoline and detergent mixture to the right side (gasoline /petrol) reservoir. When filling the reservoir, add **1 oz. (30 ml.) of Detergent to 3 oz. (90 ml.) gasoline per cylinder.** See page 3-3 for alternate filling method (Refer to page 3-2 for the proper ratios.)

/!\ WARNING

Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Wear Safety goggles.
Obtain ZERO pressure before connecting or disconnecting any fuel lines or adaptors.
Wear chemical resistant gloves when connecting or disconnecting fittings and adaptors.
Wrap shop towel around pressure fittings and adaptors when disconnecting.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

8. As shown in the figure below, connect one end of the loop adaptor (#060-2501) to the pressure line coming from the vehicle's fuel tank. Connect the other end of the loop adaptor (#060-2501) to the return line going back to the fuel tank. This forms a tank-to-tank loop, making it unnecessary to disconnect the fuel pump.



9. As shown in the figure above, connect the output (**red**) hose from the unit to the adaptor on the pressure line going into the fuel distributor.

10. As shown in the figure above, connect the return (**black**) hose from the unit to the adaptor on the return line coming from the fuel distributor.

You are now ready to begin the CIS cleaning procedure.

Continuous Injection System (CIS) *Cleaning* Procedure

Follow the steps below to circulate the cleaning mixture through the CIS fuel distributor to clean the pressure regulator and the top portion of the fuel distributor.

1. Verify that **CIS Setup Steps 1-10** above have been completed before continuing.

2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.

3. Adjust **TIMER** knob for 10 minutes. Press the **ON/OFF** switch **on**.

4. Press and hold the **START/RUN** switch.

5. Turn the Gasoline (Petrol) PRESSURE **REGULATOR** clockwise until the **PRESSURE GAUGE** reads past **4 PSI.** The pump will remain on.

6. Release the **START/RUN** switch and continue to turn the Gasoline (Petrol) **PRESSURE REGULATOR** clockwise until it is completely closed**.** This will clean the CIS fuel distributor and filter particles through the unit's filtering system. **Check all connections for leaks.**

- Make a note of the fuel pressure reading; this is the true opening pressure of the vehicle's pressure regulator when the engine is at normal operating temperature.

- **NOTE:** By turning the Gasoline (Petrol) PRESSURE **REGULATOR** in and out "**PULSING**" the mixture from time to time, the cleaning process will be enhanced in this mode.

7. After the 10 minutes has expired, adjust **TIMER** for 30 minutes. (Run time may be adjusted depending on the condition of the vehicle's fuel system.)

8. Press the **START/RUN** switch.

9. **Start the vehicle** to begin the fuel system cleaning process.

- when the cleaning process is halfway completed, step on the vehicle's accelerator quickly three or four times. **Then, maintain RPM at 1500 - 2000 for 30 seconds.**

- If the vehicle is equipped with a **Cold Start Injector**, you may use a **Pulse Tester** to energize the **Cold Start Injector** a few quick times during the run cycle to clean it.

10. **DO NOT ALLOW *CIS* VEHICLES TO RUN OUT OF FUEL. TURN OFF THE VEHICLE'S ENGINE BEFORE COMPLETION OF THE RUN CYCLE.**

11. The unit will automatically shut off and the alarm will sound when the engine is stopped. Press **off** the **ON/OFF** switch.

12. Turn the Gasoline (Petrol) **PRESSURE REGULATOR** counterclockwise on the unit to release residual pressure.

IMPORTANT

Wrap a shop towel around pressure fittings before disconnection to protect against residual fuel spray.

13. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.

14. Re-install the vehicle's gas cap.

15. **Start the vehicle** and verify that there are no leaks.

16. Test drive the vehicle for five kilometers (3 miles) immediately following the cleaning service to flush all detergent from the vehicle's fuel and exhaust systems.

Before You Begin
Diesel systems

First Time Operation

The unit is tested at the factory with special test fluids then completely drained. These test fluids are compatible with diesel engine systems. Because the unit is dry during shipping, it will be necessary to prime the machine before it is put into service.

1. Fill the units fuel filter completely with diesel fuel, approximately 1quart (0.95 L). Verify that the unit's fuel filter is securely in place on the unit.

2. Check the output/return hoses, battery connections, and all external components.

3. Attach the unit to a vehicle battery by connecting the **red** battery clip to the positive (+) battery terminal and connect the **black** battery clip to a solid ground (**11-15** Volts DC, 8 amperes at 12VDC).

4. Pour 3 - 16 ounce cans (48 ounces, 1.42L) of **Detergent for Industrial Diesel Tune** into the unit's reservoir, and 1/8 of a gallon (16 ounces, 0.47L) of diesel fuel. See page 6-2, Figure **A** for alternate filling procedure.

5. Connect the **DIESEL SIDE** output (**red**) hose and the return (**black**) hose to each other using a matched pair of adapters. This will allow the fuel to circulate and fill the system with solution.

6. Switch the **ON/OFF** switch to the **on** position. **NOTE: Alarm will sound continually until pump starts.**

7. Press and hold the **START/ON** switch, the pump will supply fluid to the output hose. Operate the system in this Prime mode for three minutes, then release **START/ON** switch, and turn **off** the **ON/OFF** switch. Remove the adaptor.

   The unit should now be primed and ready for service.

8. Disconnect battery connections if unit is not to put into immediate use.

The desired ratio is 1:1 - One part cleaning detergent to one part diesel fuel can be added if additional cleaner/fuel solution is needed.

When mixing in an external container, measure equal parts cleaner and fuel in a suitable container. Keep container sealed when not in use.

See note on next page.

NOTE

Repeat the above procedures any time the unit's reservoir and filter are completely drained of fuel, unless filling from a premixed 1:1 ratio of detergent and diesel fuel mixture.

Diesel System Cleaning Procedures

Filling and Mixture Setup

Follow the steps below to obtain the proper fuel mixture for use during the cleaning procedure. Make sure the vehicle has at least 5 gallons (18.9L) of fuel before beginning this process.

1. Start the vehicle. Allow the engine to reach normal operating temperature if possible**.**

> **NOTE:**
>
> **The diesel engine cleaning system should be operated on a level surface. For best results, engine should be up to operating temperature and fuel filters should be changed prior to service. Check the engine's oil level and add oil if necessary. DO NOT PERFORM THE CLEANING PROCESS IF THE ENGINE OIL LEVEL IS LOW. Check the coolant and add if necessary. If the engine is hot, check the level of the overflow tank. DO NOT PERFORM (and if necessary, STOP) THE CLEANING PROCESS IF THE ENGINE IS OVERHEATING.**

2. **Turn the engine OFF** when normal operating temperature has been reached.

3. Remove the units diesel reservoir cap, and add the **Detergent for Industrial Diesel Tune** to the system's reservoir. The desired **ratio is 1:1** - One part cleaning detergent to one part diesel fuel. **(Use 4oz. (118ml) diesel detergent per 1 liter engine size)**

Note: It is recommended that a full tank *mixture* should be used when working with engines that utilize electronically operated injectors.

4. To add diesel fuel to the system's reservoir using the 060-4500 adapter, see page **6-2**, **FIGURE A**. Reinstall tank cap onto reservoir, but leave cap slightly loose during the service.

> **IMPORTANT**
>
> **When mixing the cleaner in an external container, measure equal parts cleaner and fuel in a suitable container. Keep container sealed when not in use.**

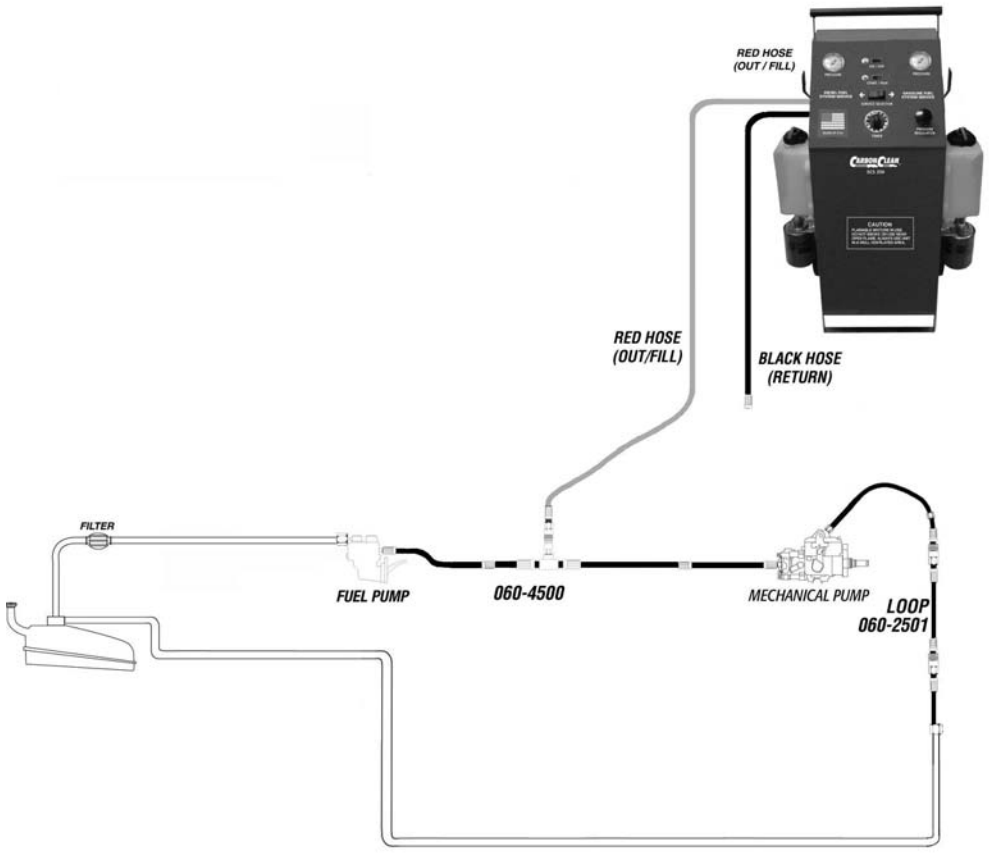
5. Attach the unit to a vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and connect the **black** battery clip to a solid ground. **12 - 15 Volts DC, 8 Amperes at 12VDC.**

> **NOTE**
>
> **If no lights turn on when the ON/OFF switch is turned on, check that the battery clips are attached to the proper terminals on the 12-Volt battery (BLACK clip to ground connection, RED clip to positive terminal). If the clips are connected correctly, verify the condition of the vehicle's battery.**

Filling Reservoir Procedure

Figure A

To pump diesel fuel into units tank, connect Red Hose to ball valve of 060-4500 tee adapter. Close ball valve. Start engine, check for leaks. Partially open ball valve enough to allow fuel to flow into



Purging Air from the System (*Priming*)

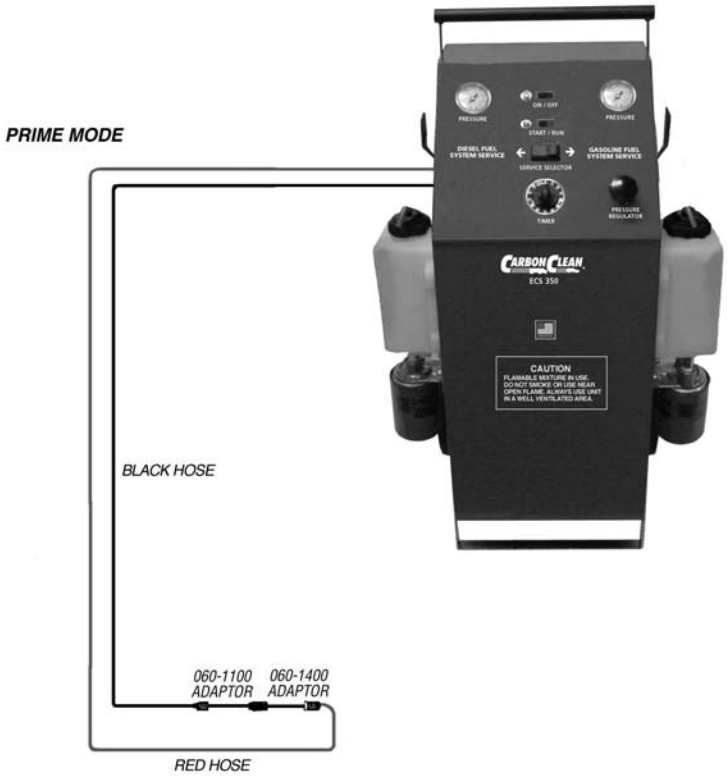
It will be necessary to purge the air from the unit's plumbing prior to connecting to the engine's fuel system.

1. Connect the **OUTPUT (RED)** hose and the **RETURN (BLACK)** hose together using adapters 060-1400 and 060-1100, as shown in **FIGURE B** below. Secure with hose clamp.

2. Press **SERVICE SELECTOR** switch to **DIESEL FUEL SYSTEM SERVICE.** Turn **TIMER** past 5 minutes. Press **ON/OFF** switch to on. Press and hold the **START/RUN** switch. Operate the system in **PRIME** mode for one minute, and then release the **START/RUN** switch. The unit's filter and hoses should now be purged of air that could possibly go in the engine's fuel system, if this procedure was not performed. Press **off** the **ON /OFF** switch.

3. Disconnect the adaptors.

Figure B



Diesel Fuel System *Setup* Procedures

1. Start the vehicle and allow the engine to reach normal operating temperature (if possible).

IMPORTANT

Do not perform the setup or cleaning process if the vehicle's engine oil or coolant level is low. If necessary, add oil and/or coolant to the vehicle. Stop the cleaning process if the engine is low on oil or overheats.

2. **Turn the engine OFF** when normal operating temperature has been reached.

3. If not already connected, attach the unit to a vehicle's **12-Volt D.C.** battery by connecting the **red** battery clip to the positive **(+)** battery terminal and connect the **black** battery clip to a solid ground.

4. Remove the vehicle's fuel cap to relieve fuel tank pressure, if necessary.

5. Disconnect the vehicles fuel lines going into the engines supply pump and the return line coming from the injectors (if applicable). There are now four open ends to work with:

Supply Line / Feed	**Return Line**
1 - From the tank	3 - From the fuel return line
2 - To the supply pump.	4 - To the tank.

IMPORTANT

Try not to allow excessive fuel loss when connecting or disconnecting the hoses from the engine or the engine may be difficult to start.

SEE NEXT PAGE

NOTE

Use an adaptor to plug off or loop back the fuel lines going to the tank to avoid any spills.

NOTE

Some fuel systems have two return lines: one from the injector pump and one from the injectors. When connecting to these types of systems, verify that both return lines have been captured. Usually they will join together at some point before going back to the tank.

6. As shown in **FIGURE C** on the next page, connect the appropriate adaptors at the points listed in **Step 5**.

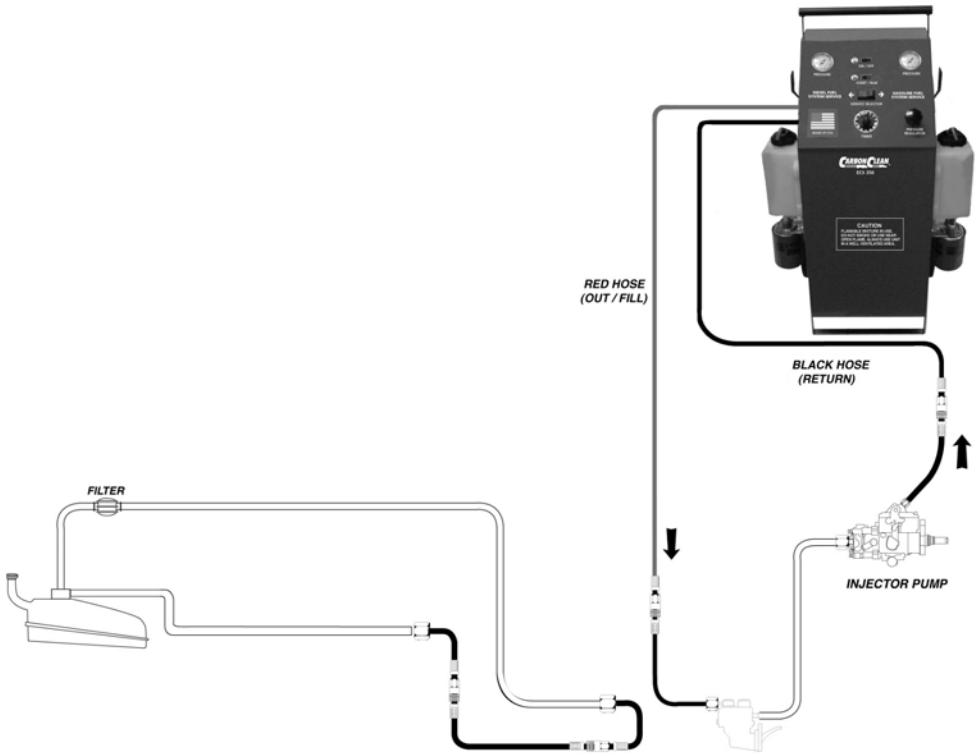
NOTE

Fuel filters and water separators in the vehicles fuel supply line should be bypassed whenever possible, as they can interfere with mixture ratios and may release contaminants into the engine during cleaning. But when they cannot be avoided replace the vehicle's fuel filter and add extra cleaner to compensate for large filter housings.

7. As shown in **FIGURE C** on the next page, connect the **OUTPUT (RED)** hose from the unit to the adaptor on the pressure line going into the engine's *fuel supply side*. Connect the **RETURN (BLACK)** hose from the unit to the adaptor on the return line coming from the engine's *fuel return*.

Diesel Cleaning Setup

FIGURE C



You are now ready to perform the Diesel cleaning procedure.

Diesel *Cleaning* Procedures

1. Verify that **Mixture, Priming,** and **Diesel Setup Procedures** above have been completed before continuing.

2. Press **SERVICE SELECTOR SWITCH** to **DIESEL FUEL SYSTEM** and press the **ON/OFF** switch **on** after turning **TIMER** past five minutes. **NOTE: Alarm will sound until pump starts.**

3. Press and hold the **START/RUN** switch. The unit will start and the pressure should rise. The pressure can be checked by observing the **FUEL PRESSURE** gauge. **Check all connections for leaks and correct as necessary.**

4. Once the pressure has stabilized, release the **START/RUN** switch. Then start the engine. **Check for fuel leaks and correct as necessary.**

5. Once the unit and engine are running, the run time can be adjusted. The default run time is 60 minutes.

Soak Mode

Use of the **Soak Mode Cycle** improves fuel system cleaning results, but it may be bypassed if a shorter service is desired.

1. After **20** minutes of operation or half of the run time, whichever is less; a **Soak Mode** can be initialized.

2. **Shut down engine.** Then press **off** the unit's **ON/OFF** switch. **NOTE:** This will shut down the pump and fuel supply to engine, so it is *very important* that engine be shut down first.

3. Let fuel mixture soak in engine for at least 15 minutes. Turn **TIMER** past five minutes. Turn the **ON/OFF** switch **on**. Press and hold the **START/RUN** switch to restart the unit and build pressure.

4. Continue on with the cleaning mode. Reset the **TIMER** to the time last shown before the **Soak Mode** was initialized. Restart the engine. The cleaning cycle will continue for the remaining run time.

NOTE

Additional Soak Cycles can be initiated by repeating steps 2 through 4 as many times as needed.

Shut Down

1. Just BEFORE the **Run** time expires, turn off the engine. During this time the pump will continue to run and supply fuel to the engine, when the **TIMER** expires, the pump shuts down. If the engine runs out of fuel, then it may be difficult to restart (especially if air is introduced into the fuel system).

2. Turn **off** unit's **ON/OFF** switch.

3. Disconnect the system battery clips from the vehicle battery.

4. Using a shop cloth to catch spills, disconnect the **OUTPUT (RED)** and **RETURN (BLACK)** hoses and adaptors from the engine. Reconnect the engine's fuel supply and return lines, making sure to tighten each connection.

IMPORTANT

Try not to allow excessive fuel loss when connecting or disconnecting the hoses from the engine or the engine may be difficult to start.

5. Start the engine and check for fuel leaks. Drive the vehicle or run engine to use up any remaining fuel mixture in the engine.

Troubleshooting and Additional Help

Refer to the list below in the unlikely event that you have problems with your **MCS 352.**

Problem:	Solution:
1. The MCS 352 is not operational or trips breaker immediately.	Polarity is reversed on vehicle battery connection. Check connections for correct polarity. Check circuit breaker on the side of the cabinet.
2. Pressure Gauge on the MCS 352 displays maximum pressure upon start up.	Output and Return hoses may be reversed. Turn **Timer** to zero and check hoses for correct connection.
3. Rapid loss of fuel from the MCS 352 reservoir.	Return hose connection may be incorrect, allowing fuel/detergent to return to the vehicle's fuel tank.
4. Start/Run switch is on but operation does not commence.	Check **Timer**. If no time is set, then turn the **Time** knob to set the run time.
5. The MCS 352 performs poorly.	Check all hoses and wires for cuts or frays. Check cabinet for dents or impact markings. Verify that the fuel filter has recently been replaced. (Refer to the maintenance log in **Appendix A** to view dates of services performed.)

ADDITIONAL HELP

Please verify that items 1- 7 above have been reviewed before calling for additional assistance.

In the unlikely event that problems persist with the MCS 352, call: Your *Local Distributor*

Or: MOTORVAC TECHNOLOGIES INC.
1431 S. VILLAGE WAY
SANTA ANA, CA 92705 USA

PHONE: 714.558.4822
FAX: 714.558.0754
E-MAIL: Marketing@motorvac.com
WEB SITE: www.CarbonClean.com

Appendix A - Maintenance

Maintenance Procedures

The following maintenance procedures should be performed on a routine basis:

1. Drain the unit's fuel reservoirs and replace the fuel filters after every 30 cleaning services for Gasoline (Petrol), or every 10 cleaning services for the unit's diesel fuel reservoir for maximum performance as described in the next section.

2. Clean the exterior with a non-abrasive cleaning agent or similar product to keep the cabinet looking new. Check the cabinet for dents or impact markings**.**

3. Check all hoses and wires for cuts or frays.

Replacing the MCS 352 Fuel Filters

The unit's gasoline (petrol) fuel reservoir should be drained and the fuel filter replaced after every 30 cleanings to ensure maximum system performance and pump life. The unit's diesel fuel reservoir should be drained and the fuel filter replaced every 10 cleanings for maximum performance.

Drain the Fuel Reservoir

1. Turn the **SERVICE SELECTOR** switch to either Gasoline (Petrol) or Diesel FUEL SYSTEM.

2. On the Gasoline (Petrol) side, turn the **PRESSURE REGULATOR** on the control panel clockwise until it is completely closed**.**

3. Attach the unit to the vehicle's battery by connecting the **red** battery clip to the positive (**+**) battery terminal and the **black** battery clip to a solid ground point as far from the battery as possible. Turn on the **ON/OFF** switch.

4. Connect the #060-1400 adaptor to the output (**red**) hose, then drain the fuel from the unit's fuel reservoir using the following procedure:

   - Set the **TIMER** until it displays five minutes.
   - Direct the output (**red**) hose into an appropriate container.
   - Press and hold the **START/RUN** switch until the fuel from the unit has been emptied into the container.
   - Release the **START/RUN** switch.
   - On the Gasoline (Petrol) side, turn the **PRESSURE REGULATOR** counterclockwise until completely open to relieve any residual pressure.

5. Enter your initials, the date, and a check mark in the appropriate boxes of the Maintenance Record at the end of this chapter.

Replace the Fuel Filter

1. Remove the old fuel filter from the mounting station on the side of the unit's cabinet and install the new filter. **Verify the filter is tightened securely.**

2. Add the mixture back into the reservoir.

3. Check the filter for leaks.

4. Enter your initials, the date, and a check mark in the appropriate boxes of the Maintenance Record at the end of this chapter.

The unit is now ready for the next cleaning service.

Maintenance Record

Use the following table to keep a record of maintenance performed on the **MCS 352**.

Initial/Date	DRAIN FUEL RESERVOIR ✓	REPLACE FUEL FILTER ✓	CLEAN EXT. CABINET ✓	CHECK HOSES AND WIRES ✓	OTHER ✓
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Initial/Date	DRAIN FUEL RESERVOIR ✓	REPLACE FUEL FILTER ✓	CLEAN EXT. CABINET ✓	CHECK HOSES AND WIRES ✓	OTHER ✓
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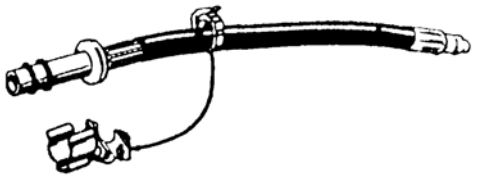
Appendix B - System Accessories

Standard Adaptor Kit (200-3025A)

The standard adaptor kit is included with your system.
The most commonly used application is listed however, other applications may apply.

PART & NO.	QTY	APPLICATION
060-1000	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1100	2	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE- MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1200	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1300	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1400	2	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1500	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1700	1	CARBURETED VEHICLES WITH 5/16" FLARE FUEL INLETS. USE WITH 060-3304 FOR SOME FUEL INJECTED VEHICLES - RETURN LINE.
060-1800	1	CARBURETED AND EARLY FUEL INJECTED VEHICLES WITH 3/8" FLARE FUEL INLETS.
PART & NO.	**QTY**	**APPLICATION**

060-2501	1	FORMS "TANK TO TANK" LOOP ON ALL VEHICLES. USED TO EXTEND VEHICLE'S RETURN LINE DURING DIAGNOSTICS.
060-2800	1	1/4" MALE. LATE MODEL VEHICLES TBI AND/OR PORT FUEL. (GM-CHRYSLER-JEEP/EAGLE).
060-3100 080-3402 (O-Ring)	1	TBI AND/OR PORT FUEL PRESSURE LINE - MALE. G.M. VORTEC M16 x 1.5
060-3105	1	TBI AND/OR PORT FUEL PRESSURE LINE - FEMALE. G.M. VORTEC M16 x 1.5
080-3302 060-3300 (O-	1	TBI AND/OR PORT FUEL RETURN LINE - MALE. G.M. VORTEC M14 x 1.5
060-3305	1	TBI AND/OR PORT FUEL RETURN LINE - FEMALE. G.M. VORTEC M14 x 1.5
080-3402 (O-Ring)	1	3/8" MALE SPRING LOCK WITH CLIP (GREY). PORT FUEL-RETURN LINE. (USE AS PRESSURE LINE ON SOME RANGERS AND BRONCOS)
060-3505	1	3/8" FEMALE SPRING LOCK. PORT FUEL - RETURN LINE. (USE AS PRESSURE LINE ON SOME RANGERS AND BRONCOS)

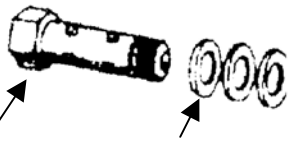
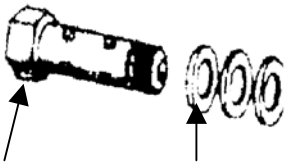
PART & NO.	QTY	APPLICATION
 060-3600 080-3602 (O-Ring) 080-3601 (Clip)	1	1/2" MALE SPRING LOCK WITH CLIP (BLACK). PORT FUEL - PRESSURE LINE. FORD
060-3605	1	1/2" FEMALE SPRING LOCK PORT FUEL - PRESSURE LINE. FORD
060-3901 080-3904 (Clip)	1	3/8" QUICK DISCONNECT PORT FUEL AND TBI
060-4200	1	5/16" MALE TBI AND/OR PORT FUEL (GM-CHRYSLER-JEEP/EAGLE).
060-4300	1	3/8" TBI AND/OR PORT FUEL (GM-CHRYSLER-JEEP/EAGLE-FORD).
060-3902	1	1/4" FEMALE TBI AND/OR PORT FUEL (GM-CHRYSLER-JEEP/EAGLE-FORD).

 060-4501		Tee Adaptor For Single Line Fuel Injection Systems	
 060-0440	 060-0450	2 2	HOSE CLAMPS. USE WITH 060-1000 THROUGH 060-1500.

Deluxe Adaptor Kit (200-3026A)

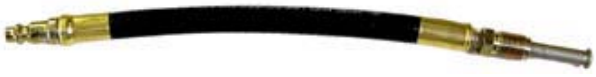
The Deluxe adaptor kit is included with your system.
The most commonly used application is listed however, other applications may apply.

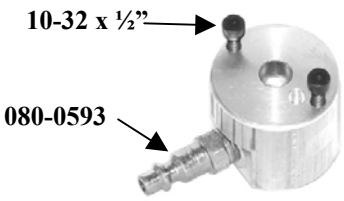
PART & NO.	QTY	APPLICATION
060-1600	1	12MM BANJO FITTING CIS OR EFI SYSTEMS. IN CONJUNCTION WITH 060-1900, 060-1901, 060-1902.
060-1602	1	12MM 90° BANJO FITTING CIS OR EFI SYSTEMS. IN CONJUNCTION WITH 060-1900, 060-1901, 060-1902
060-2402	2	14MM BANJO FITTING BMW AND LATE MODEL VW PRESSURE LINE.
060-3304 080-3302 (O-Ring)	1	USED WITH MV0601700 TBI AND/OR PORT FUEL RETURN LINE - MALE M14 x 1.5
060-3400 080-3402 (O-Ring)	1	USED WITH 060-1800 TBI AND/OR PORT FUEL RETURN LINE - MALE M16 x 1.5
060-3508	1	"TEST PORT/SCHRADER VALVE" CONNECTION - FORD. **NOTE:** THE SCHRADER VALVE CORE MUST BE REMOVED.
060-3700 080-3701 (Viton Seal)	1	"TEST PORT/SCHRADER VALVE" CONNECTION - GM.
060-3900 080-3903 (Clip)	2	5/16" QUICK DISCONNECT PORT FUEL AND TBI FORD 5 LITER

 060-3901 080-3904 (Clip)	1	3/8" QUICK DISCONNECT PORT FUEL AND TBI
 060-4300	1	3/8" TBI AND/OR PORT FUEL (GM-CHRYSLER-JEEP/EAGLE).
 060-1900 (Bolt) 060-1901 (Washer) 060-1902 (Nut)	2 6 2	CONNECTS 12MM BANJO FITTINGS FOR DIAGNOSTICS AND/OR CREATING A LOOP.
 060-2740 (Bolt) 060-2741 (Washer) 060-2742 (Nut)	1 3 1	CONNECTS 14MM BANJO FITTINGS FOR DIAGNOSTICS AND/OR CREATING A LOOP

New / Optional GAS Adapters offered by MotorVac

The following GAS adapters have been added to the CarbonClean adaptor line-up. The adapters listed are not included with any configured adapter sets & may be purchased separately from MotorVac Technologies, Inc.

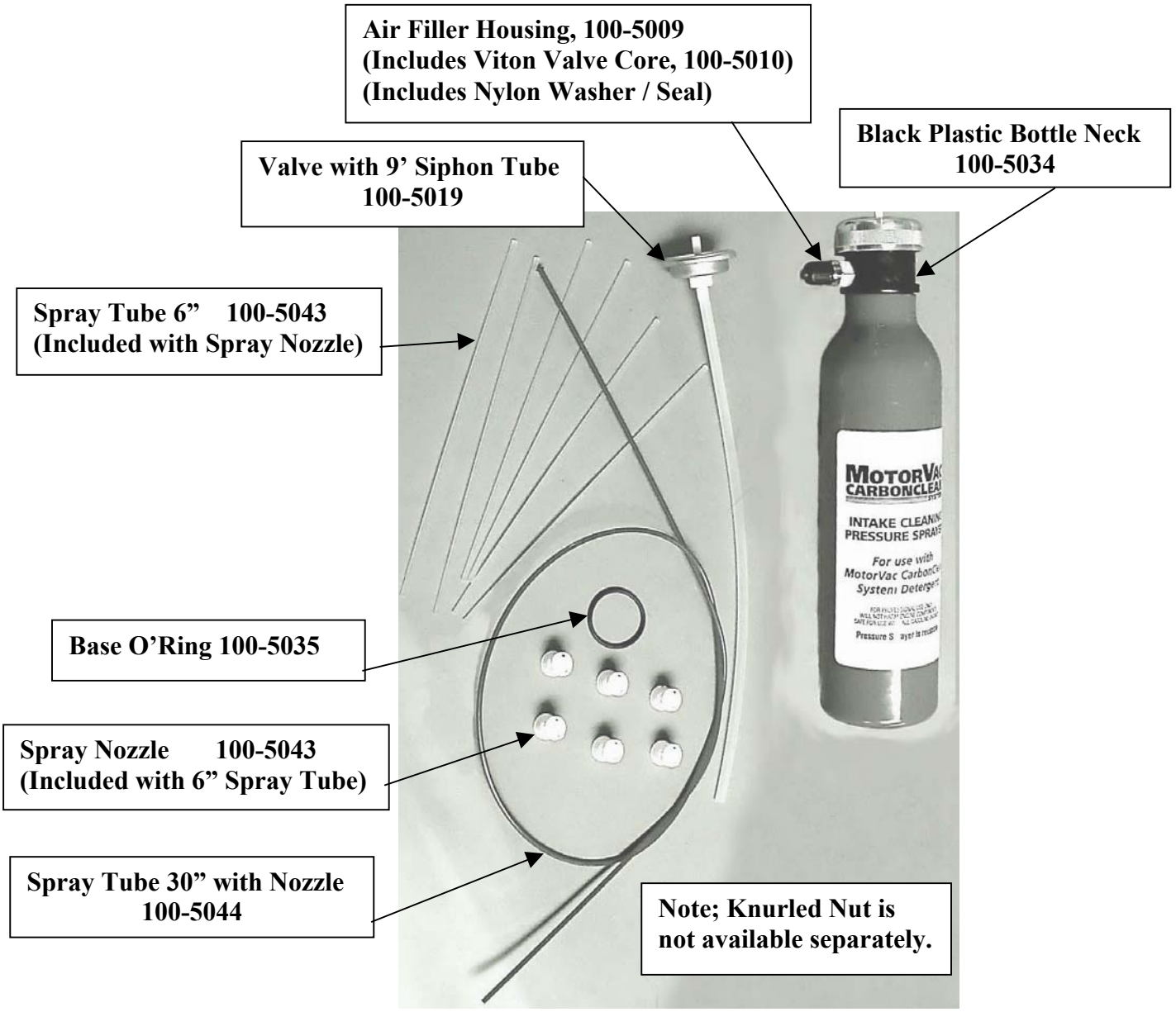
PART & NO.	APPLICATION
060-4800 / Male Side	Late Model Mitsubishi Products (Also includes Chrysler Imports, Various Kia, Suzuki, & Hyundai Gas Powered Models)
060-4805 / Female Side	Late Model Mitsubishi Products (Also includes Chrysler Imports, Various Kia, Suzuki, & Hyundai Gas Powered Models)
060-2310 / Female Side	“Bubble Flare” Type Adapter / 14 mm x 1.5 Common Applications Include: Mercedes-Benz, Volkswagen, Audi,
060-2315 / Male Side	“Bubble Flare” Type Adapter / 14 mm x 1.5 Common Applications Include: Mercedes-Benz, Volkswagen, Audi,
060-2320 / Female Side (O-Ring P/N: 080-2321)	Japanese / Toyota 14 mm x 1.5 Flare Type Adaptor (Pressure Side)
 **060-2325 / Male Side**	Japanese / Toyota 14 mm x 1.5 Flare Type Adaptor (Pressure Side)
060-3101 / Male Side **080-3402 O’Ring**	2000 & Newer Nissan Products (Includes Nissan Quest & Maxima)

	**060-3102 / Female Side**	2000 & Newer Nissan Products (Includes Nissan Quest & Maxima)

I.C.S. (Intake Cleaning System) Kit

Part Number – (200-8667, Red Bottle)

One Kit Includes All Components Shown Below:



I.C.S. Repair Kit available Separately

Part Number – (200-5046)

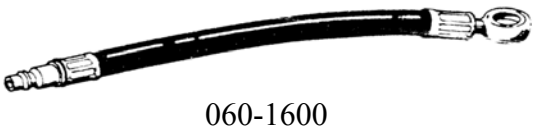
One Kit Includes Components Listed Below:

- *Valve with 9' Siphon Tube (100-5019)*
- Base O'Ring (100-5035)

Appendix B - System Accessories

Master Adaptor Kit (MV P/N 200-3031)

Contact your Industrial Diesel Tune sales representative for information on obtaining the Master adaptor kit. The most commonly used application is listed; however, other applications may apply.

PART & NO.	QTY	APPLICATION
060-1000	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1100	1	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE- MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1200	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - MALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1300	2	GENERAL APPLICATIONS UTILIZING 1/4" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1400	1	GENERAL APPLICATIONS UTILIZING 5/16" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
060-1500	2	GENERAL APPLICATIONS UTILIZING 3/8" FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
 060-1600	1	12MM BANJO FITTING IN CONJUNCTION WITH 060-1900, 060-1901, 060-1902.
060-1602	1	12MM 90° BANJO FITTING IN CONJUNCTION WITH 060-1900, 060-1901, 060-1902

PART & NO.	QTY	APPLICATION
060-2402	2	14MM BANJO FITTING
060-2501	1	FORMS “TANK TO TANK” LOOP ON ALL VEHICLES.
060-2740 (Bolt) 060-2741 (Washer) 060-2742 (Nut)	1 3 1	CONNECTS 14MM BANJO
060-3200	1	1/4" MALE NPT.
061-0004	2	#4 FLARE, 45 DEGREE MALE
061-0005	2	#5 FLARE, 45 DEGREE MALE
061-0006	2	#6 FLARE, 45 DEGREE MALE
061-0505	2	#5 X #5 FEMALE FLARE (45) COUPLER

PART & NO.	QTY	APPLICATION
061-0604	2	#6 X #4 FEMALE FLARE (45) COUPLER
061-3510	2	GENERAL APPLICATIONS UTILIZING 3/16” FUEL LINE - FEMALE. (USE WITH SUITABLE HOSE CLAMPS.)
061-5800	2	HOSE CONNECTOR FOR AIR BRAKE TYPE FITTINGS 5/8”